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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/797,814	03/10/2004	Jorg-Reinhardt Kropp	075791.0235	7472

5073 7590 11/29/2006

BAKER BOTTS L.L.P.
2001 ROSS AVENUE
SUITE 600
DALLAS, TX 75201-2980

EXAMINER	
LIU, LI	

ART UNIT	PAPER NUMBER
2613	

DATE MAILED: 11/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/797,814	KROPP, JORG-REINHARDT	
	Examiner	Art Unit	
	Li Liu	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *03/10/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 03/10/2003 is being considered by the examiner.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 7-9, 13 and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Tabata (US 2004/0175186).

1). With regard to claim 1. Tabata discloses a bidirectional transmitting and receiving device, comprising:

a transmitting component (laser diode 2 in Figure 1) comprising an emission area of a first size, that emits light at a first wavelength (e.g., 1.3 μm);

a receiving component (photodiode 3 in Figure 1) comprising a receiving area of a second size, that receives light at a second wavelength (e.g., 1.55 μm); and

coupling optics (4 and 5 in Figure 1, or 13 and 14 in Figure 10, or 15 in Figure 12, or 18 and 19 in Figure 13 etc.) adapted to couple light between the transmitting

component and the receiving component on one hand (9 in Figure 1) and an optical waveguide that is to be coupled on the other hand (6 in Figure 1), wherein the coupling optics comprise a diffraction structure (e.g. 4 and 5 in Figure 1, 13 in Figure 10, 19 in Figure 13, and 25 in Figure 17) that focuses light at the first wavelength and at the second wavelength differently ([0011] and [0012]), and

wherein the transmitting component and the receiving component are arranged alongside one another or one above the other (Figure 1, laser diode 2 and photodiode 3 are arranged alongside), and wherein the transmitting component is located at the focus of the diffraction structure for the emitted light at the first wavelength (Figures 1, 10 and 13), and light that is emitted from the transmitting component at the first wavelength is imaged on an end surface of the optical waveguide ([0036).

2). With regard to claim 7. Tabata discloses wherein the diffraction structure comprises an optical grating (13 in Figure 10, or 19 in Figure 13, or 25 in Figure 17) in conjunction with a refractive lens (14 in Figure 10, or 18 in Figure 13, or 26 in Figure 17), or an asymmetric diffractive lens (Figures 3B and 14), with the emitted light and the received light being deflected at different angles ([0073], [0084], [0100])

3). With regard to claim 8, Tabata discloses wherein wherein the transmitting component and the receiving component are arranged generally alongside one another (9 in Figures 10, 13 and 17).

4). With regard to claim 9, Tabata discloses wherein the transmitting component is located at the focus of the diffraction structure for the emitted light at the first wavelength ([0073], Figures 10, 13 and 17), and the receiving component is located at

the focus of the diffraction structure for the received light at the second wavelength ([0073] and [0102], Figures 10, 13 and 17).

5). With regard to claim 13, Tabata discloses wherein non-centric rings with a different phase relationship are provided for the diffraction structure that is in the form of an asymmetric diffractive lens (Figures 3B, 13 and 14).

6). With regard to claim 14, Tabata discloses the device, further comprising a substrate having a first surface (e.g. the surface of DOEs 4 and 5 lays on, in Figure 1) that faces an optical waveguide that is to be coupled thereto, and having a second surface (substrate 9 in Figure 1) that is generally parallel to the former, wherein the diffraction structure is formed or arranged on the first surface (the surface of DOE 5 is arranged on the first surface), and wherein the combination of the transmitting component and receiving component (LD 2 and PD 3 are on substrate 9 in Figure 1) is arranged on the second surface.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 2-6, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tabata (US 2004/0175186) as applied to claim 1 above, and in view of Kuhara et al (US 5,787,215).

1). With regard to claim 2, Tabata discloses all of the subject matter as applied to claim 1 above. And Tabata further discloses wherein the diffraction structure comprises a diffractive lens (4 and 5 in Figure 1, 13 in Figure 10, 19 in Figure 13, 25 in Figure 17), and wherein the transmitting component (2 in Figure 1) is located at the focus of the diffraction structure for the emitted light at the first wavelength.

But Tabata does not expressly disclose while the receiving component (3 in Figure 1) is located away from the focus of the diffraction structure for the received light at the second wavelength, and light which is emitted from the optical waveguide at the second wavelength is detected in an area that is widened again or is not yet focused.

However, Kuhara et al, in the same filed endeavor, discloses a bidirectional transceiver, in which the receiving component (PD 64 in Figures 10 and 11) is located away from the focus for the received light at the second wavelength (λ_1 in Figures 11 and 12), and light which is emitted from the optical waveguide at the second wavelength is detected in an area (66 in Figures 10 and 11) that is not yet focused.

Kuhara et al provide a lower cost, smaller size LD/PD module with a lower loss of light and feasible to a long range bidirectional optical communication (column 7 line 41-58). Tabata discloses a diffraction structure that focuses light at the first wavelength and at the second wavelength differently and the PD and LD are arranged alongside one another. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the one (PD) above the other (LD) structure as taught by Kuhara et al to the system of Tabata so that a more flexible arrangement of light emitting and receiving can be obtained so to reduce cost and loss of signal.

2). With regard to claim 3, Tabata in view of Kubara et al discloses all of the subject matter as applied to claims 1-3 above. But Tabata does not expressly disclose wherein the transmitting component and the receiving component are arranged one behind the other in the beam path, with the receiving area of the receiving component being larger than the emission area of the transmitting element by a factor of at least three.

However, Kuhara et al discloses a bidirectional transceiver, in which the transmitting component (LD in Figure 12) and the receiving component (PD in Figure 12) are arranged one behind the other in the beam path, with the receiving area (66 in Figure 10) of the receiving component being larger than the emission area of the transmitting element by a factor of at least three (the receiving surface of PD has a diameter up to 200 μm, column 21, line 37-38, which is three time larger than the emission area of the LD, which is usually less than 40μm).

Kuhara et al provide a lower cost, smaller size LD/PD module with a lower loss of light and feasible to a long range bidirectional optical communication (column 7 line 41-58). Tabata discloses a diffraction structure that focuses light at the first wavelength and at the second wavelength differently and the PD and LD are arranged alongside one another. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the one (PD) above the other (LD) structure as taught by Kuhara et al to the system of Tabata so that a more flexible arrangement of light emitting and receiving can be obtained so to reduce cost and loss of signal.

3). With regard to claim 4, Tabata in view of Kubara et al discloses all of the subject matter as applied to claim 1 and 2 above. And Tabata in view of Kubara et al further discloses wherein the light (λ_2 in Figures 10 and 11 of Kuhara) that is emitted from the transmitting component (LD in Figures 10 and 11 of Kuhara) at the first wavelength passes through the receiving component (64 in Figure 10 of Kuhara).

4). With regard to claim 5, Tabata in view of Kubara et al discloses all of the subject matter as applied to claim 1-4 above. But Tabata does not disclose wherein the receiving component comprises a local transparent area in the region of the receiving area, through which the light that is emitted from the transmitting component passes.

However, Kuhara et al discloses the receiving component comprises a transparent area (the photodiode is a wavelength selective PD, it detects λ_1, but transparent to λ_2, Figures 10 and 11, column 4 line 8 line 30-42), in the region of the receiving area, through which the light (λ_2 in Figure 10) that is emitted from the transmitting component passes.

Kuhara et al provide a lower cost, smaller size LD/PD module with a lower loss of light and feasible to a long range bidirectional optical communication (column 7 line 41-58). Tabata discloses a diffraction structure that focuses light at the first wavelength and at the second wavelength differently and the PD and LD are arranged alongside one another. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the one (PD) above the other (LD) structure as taught by Kuhara et al to the system of Tabata so that a more flexible arrangement of light emitting and receiving can be obtained so to reduce cost and loss of signal.

5). With regard to claim 6, Tabata in view of Kubara et al discloses all of the subject matter as applied to claim 1 and 2 above. But Tabata in view of Kubara et al does not expressly discloses wherein the receiving component is mounted directly on the transmitting component by flip-chip mounting or adhesive bonding.

Although Tabata in view of Kubara et al doesn't specifically disclose the "mounting" by flip-chip mounting or adhesive bonding, such limitation are merely a matter of design choice and would have been obvious in the system of Tabata in view of Kubara et al. Kubara et al teaches that receiving component (64 in Figure 21A) is just above the transmitting component (70 in Figure 21A), and both PD and LD are then mounted on header 111 in Figure 21A through submounts 120 and 122. The limitations in claims 6 do not define a patentably distinct invention over that in Kubara et al since both the invention as a whole and Kubara et al are directed to arrange the receiving component above the transmitting component. Therefore, by flip-chip mounting or adhesive bonding or other kind of mounting would have been a matter of obvious design choice to one of ordinary skill in the art.

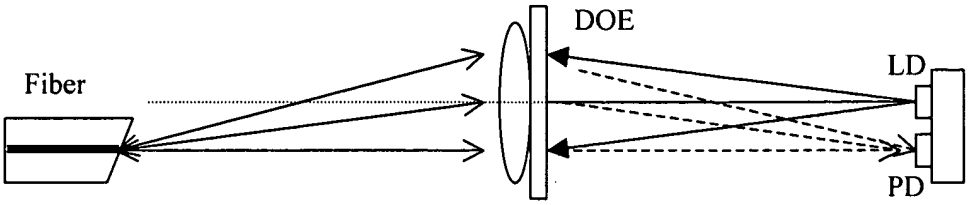
6). With regard to claim 10, Tabata in view of Kubara et al discloses all of the subject matter as applied to claim 1 and 7 above. And Tabata further discloses, in Figures 3B, 13 and 14, that the refractive or diffractive lens is arranged laterally offset with respect to the optical waveguide axis. But Tabata does not expressly discloses wherein the optical waveguide comprises an end surface that is inclined with respect to the optical waveguide axis.

However, Kuhara et al discloses a bidirectional transceiver, in which the optical waveguide comprises an end surface that is inclined with respect to the optical waveguide axis at an angle of 8 degrees for preventing reflected light from returning to the laser (137 in Figure 21A, column 27 line 41-44).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the inclined fiber end as taught by Kuhara et al to the system of Tabata so that a light reflected from the end surface is prevented from returning to the laser and interference is reduced.

7). With regard to claim 11, Tabata in view of Kubara et al discloses all of the subject matter as applied to claim 1, 7 and 10 above. But Tabata does not expressly discloses wherein the diffraction structure is arranged in the beam path such that the light that is emitted from the transmitting component passes between the transmitting component and the diffraction structure generally parallel to the optical waveguide axis.

In Figure 13 of Tabata's system, the LD/PD substrate 9 is inclined from the optical axis connecting the center of spherical lens and optical fiber. When the fiber end is cut at an angle of 8 degrees, due to the refraction the center axis of the input and output light will be tilted by a small angle with respect to the fiber core axis. Since Tabata uses an eccentric non-sphereical diffractive optical element or laterally offset (DOE) lens, the system of Tabata can be easily adjusted so that the substrate 9 is not inclined and the light emitted from the transmitting component passes between the transmitting component and the diffraction structure generally parallel to the optical waveguide axis, such as illustrated in following figure:



Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the inclined fiber end as taught by Kuhara et al to the system of Tabata so that the light emitted from the LD passes between the LD and the diffraction structure generally parallel to the optical fiber axis, and a light reflected from the end surface is prevented from returning to the laser and interference is reduced.

6. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tabata (US 2004/0175186) as applied to claim 1 above, and in view of Gal et al (US 5,600,486).

Tabata discloses all of the subject matter as applied to claims 1 and 7 above. Tabata uses an integrated lens (Figure 12), one surface is a lens/grating surface. But Tabata does not expressly wherein, in the diffraction structure that is in the form of an optical grating in conjunction with a refractive lens, the optical grating is formed or arranged on a planar face of a **plano-convex** lens.

However, Gal et al discloses an integrated lens, wherein, in the diffraction structure that is in the form of an optical grating in conjunction with a refractive lens, the optical grating is formed or arranged on a planar face of a **plano-convex** lens (Figure 2 right side, and 53 in Figure 11).

Gal et al provide an integrated diffractive optical element (DOE) lens with a high efficiency and excellent spatial separation of spectral. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the integrated diffractive optical element as taught by Gal et al to the system of Tabata so that a high efficiency integrated diffractive element can be obtained.

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tabata (US 2004/0175186) as applied to claims 1 and 14 above, and in view of Hurt et al (US 2003/0007753).

Tabata discloses all of the subject matter as applied to claims 1 and 14 above. But Tabata does not expressly wherein the combination of the transmitting component and the receiving component is sheathed by a potting compound.

However, the transparency potting compound has been widely used for sheathing the photoelectrical elements so to secure the photoelectrical elements and prevent the interference from outside environment, Hurt et al discloses such kind of potting compound (2 in Figure 1) to secure the photoelectrical element. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the potting compound as taught by Hurt et al to the system of Tabata so that the photoelectrical elements can be secured and interference from environment can be eliminated.

8. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tabata (US 2004/0175186) and Hurt et al (US 2003/0007753) as applied to claims 1, 14 and 15

above, and in further view of Ohnishi et al (US 5,555,334) and Cina et al (US 5,537,504).

Tabata in view of Hurt et al discloses all of the subject matter as applied to claims 1, 14 and 15 above. But Tabata does not expressly wherein the first surface of the substrate is connected to a guide element for connection of an optical waveguide.

However, Ohnishi et al, in the same field of endeavor, discloses an optical transceiver module, in which the first surface of the substrate (the surface the diffractive grating 6 lays on, Figure 1) is connected to a sealing package 12, while the optical fiber is held by a fiber holder 14, both the package 12 and fiber holder 14 are fixedly secured to the stem 10. That is, through stem 10, the first surface and the guide element are integrated.

Cina et al also discloses a fiber-optoelectronic subassembly, in which the first surface of the lens (3 in Figure 1) is connected to a guide element (2 in Figure 1) for connection of an optical waveguide.

Ohnishi et al and Cina et al discloses optical transmission modules with a small size, low cost and simpler alignment. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the similar assembly as taught by Cina et al and Ohnishi et al to the system of Tabata so that the a compact transceiver with a small size, low cost and simpler alignment can be obtained.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Forrest et al (US 4,709,413) discloses a bidirectional fiber system in which at one terminal the output of a light source (LED or LD) is coupled through a small diameter hole in the active area of a photodiode into the core of fiber.

Katayama (US 5,696,750) discloses a optical head apparatus in which the light source is above the photodiode, and the active area of a photodiode is much larger than the light emitting area (Figures 14 and 22).

Jewell et al (US 6,243,508) discloses a novel electro-opto-mechanical assembly.

Asghari (US 6,498,666) discloses a integrated optical transceiver.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Li Liu whose telephone number is (571)270-1084. The examiner can normally be reached on Mon-Fri, 8:00 am - 5:30 pm, alternating Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Li Liu
November 22, 2006

KENNETH VANDERPUYE
SUPERVISORY PATENT EXAMINER